

## DIFFERENTIALLY-DRIVEN LOOP EXTENDER

### ABSTRACT OF THE DISCLOSURE

Systems and methods are disclosed for improving DSL performance, including ADSL and VDSL performance, over a local loop between a telephone company central office and a customer premises. In particular, a loop extender is coupled to the local loop and differentially amplifies downstream and upstream DSL signals to at least partially compensate for DSL signal attenuation that occurs as DSL signals pass over the local loop. Pursuant to one embodiment, the loop extender includes an upstream filter / amplifying equalizer, a downstream filter / amplifying equalizer, a differential amplifier pair, an inverting amplifier, and a pair of electromagnetic hybrids, which couple the loop extender to the loop and provide upstream and downstream signal amplification. In another embodiment, the loop extender includes POTS loading coils to improve the POTS or voice band transmission over the local loop. According to this embodiment, the loop extender provides both improved POTS band signal transmission and DSL service.